

Modeling Soil Erosion Potential in the Transboundary Catchment of River Uмба Using Remotely Sensed Data

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Introduction

Soil erosion reduces soil productivity, blocks irrigation canals and silts reservoirs thus increasing their maintenance cost⁽¹⁾. In marine ecosystems, sedimentation smothers coral reefs, seagrasses and mangroves thus reducing their ability to offer ecosystem services such as shoreline protection, carbon capture and habitat functions⁽²⁾.

Objective

- ♦ To estimate the potential soil erosion within river Uмба catchment area using remotely sensed data.

Methodology

Data derived from MODIS (land cover), TRMM (rainfall), Landsat (topography) and FAO (soil map) databases was processed in GIS and used in the Universal Soil Loss Equation to model the soil erosion.

The model estimates soil erosion as:

$$A = R K L S C P$$

Where A, R, K, LS, C and P are annual soil erosion rate, rainfall erosivity, soil erodibility, topographic factor, land cover factor and erosion control practice respectively⁽³⁾.

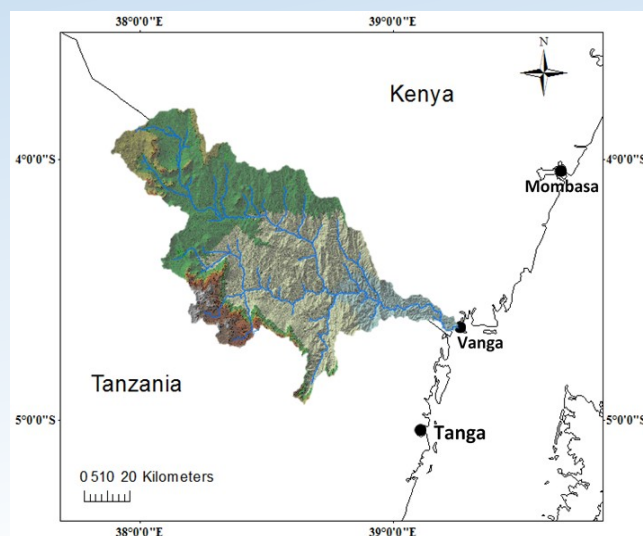


Fig 1: The study area (8070 km²)

References

- ¹ Pimentel, David, et al. "Environmental and economic costs of soil erosion and conservation benefits." *Science* 267.5201 (1995): 1117.
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- ³ Uddin, Md Shams, et al. "Economic valuation of provisioning and cultural services of a protected mangrove ecosystem: a case study on Sundarbans Reserve Forest, Bangladesh." *Ecosystem Services* 5 (2013): 88-93.

Acknowledgement

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Preliminary Results and Discussion

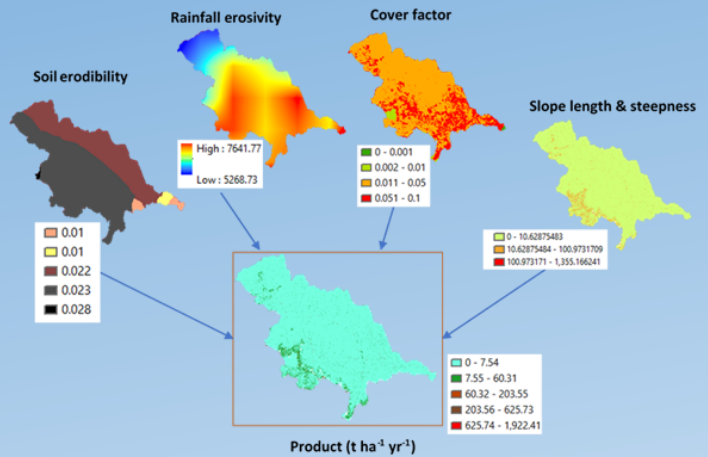


Fig 2: The model parameters and product

Layer	1	2	3	4	5
1	1.00000	-0.15835	0.22889	-0.02010	0.14329
2	-0.15835	1.00000	-0.04286	0.04501	0.03749
3	0.22889	-0.04286	1.00000	0.06824	0.06824
4	-0.02010	0.04501	0.06824	1.00000	0.27311
5	0.14329	0.03749	0.06824	0.27311	1.00000

1 Land cover 2 Soil map 3 Rainfall 4 Topography 5 Product

From the results, 7.5 t ha⁻¹ yr⁻¹ is the major soil erosion rates within the catchment.

Analysis of the biophysical factor contributing to soil erosion shows that topography and land cover are highly correlated with soil erosion rates.

Conclusion

- ♦ This method provides a quick and cost effective method to estimate the risk of soil erosion especially in data deficient regions.
- ♦ River Uмба catchment has a relatively high soil erosion potential hence the need for soil conservation measures.
- ♦ Remotely sensed data and models are a simplification of reality hence has to be calibrated and validated to improve reliability of the results.